HOUSE OF COMMONS SESSION 1994–95

SCIENCE AND TECHNOLOGY COMMITTEE

First Special Report

The Government's Response to the Science and Technology Committee's Second Report, Session 1993–94, the Forward Look of Government-funded Science, Engineering and Technology 1994

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The Science and Technology Committee is appointed under Standing Order No 130 to examine the expenditure, administration and policy of the Office of Science and Technology and associated public bodies.

The Committee consists of 11 Members. It has a quorum of three. Unless the House otherwise orders, all Members nominated to the Committee continue to be Members of it for the remainder of the Parliament.

The Committee has power:

(a) to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place, and to report from time to time;

(b) to appoint specialist advisers either to supply information which is not readily available or to elucidate matters of complexity within the Committee's order of reference;

(c) to communicate to any other such committee and to the Committee of Public Accounts its evidence and any other documents relating to matters of common interest; and

(d) to meet concurrently with any other such committee for the purposes of deliberating, taking evidence, or considering draft reports.

The following were nominated Members of the Committee on 13 July 1992:

Mr Spencer Batiste
Dr Jeremy Bray
Mr Malcolm Bruce
Mrs Anne Campbell
Cheryl Gillan
Mr William Powell
Sir Giles Shaw
Sir Trevor Skeet
Dr Gavin Strang
Sir Gerard Vaughan
Dr Alan W Williams

Sir Giles Shaw was elected Chairman on 15 July 1992.

On 9 November 1992 Mr Malcolm Bruce was discharged and Mr Andrew Miller added to the Committee.

On 16 November 1992 Dr Gavin Strang was discharged and Dr Lynne Jones added to the Committee.

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FIRST SPECIAL REPORT

The Science and Technology Committee has agreed to the following Special Report:

We have received the following letter from the Chancellor of the Duchy of Lancaster enclosing the Government response to the Second Report from the Science and Technology Committee, Session 1993–94, on The Forward Look of Government-funded Science, Engineering and Technology 1994 (HC 422):

Letter to the Chairman from the Chancellor of the Duchy of Lancaster (1 February 1995)

The Government response to the House of Commons Select Committee on Science and Technology Report on the Forward Look of Government-funded Science, Engineering and Technology 1994

I have pleasure in enclosing with this letter the response of the Government to the Select Committee's report on the 1994 Forward Look of Government-funded Science, Engineering and Technology.

I am most grateful to you and the Committee for the time you have devoted to your most helpful examination of the first Forward Look.

We shall take the comments of the Committee into account in our preparations for the 1995 Forward Look. In particular, we shall include historic figures for Business Enterprise Research and Development that are expressed in real terms.

In addition, I am pleased to report that my Department is working with other Departments to measure implementation of the key messages contained in "Realising our potential". As the Committee acknowledges in its report, developing the right measures will take time and progress will be reported in the 1995 Forward Look.

This year I believe we shall be able to make further progress towards the ambitious prospectus for the Forward Look that we set out in "Realising our potential".

We shall have the benefit of the results of the Technology Foresight Programme currently underway. I intend to publish the 1995 Forward Look and a report on Foresight, together, in May of this year. This change to our plans for an April publication for the Forward Look each year, as set out in "Realising our potential", will permit the Forward Look to become a more integral part of the Public Expenditure Survey.

Finally, "Realising our potential" intended that the Forward Look would open up for public scrutiny and debate the current plans and priorities for publicly-funded science, engineering and technology. We will therefore use our best endeavours to find time for a parliamentary debate on science and technology shortly after the Forward Look is published each year. The precise timing and length of the debate should be determined through the usual Parliamentary channels.

Government response to the Second Report of the House of Commons Select Committee on Science and Technology, 1993–94

THE OPERATIONAL PURPOSE OF THE DOCUMENT

We recommend that the Government provide Parliamentary time each year for a full day's debate on science and technology shortly after the Forward Look is published. (Para 6)

1. The Government will use its best endeavours to find time for a debate about Science and Technology each year shortly after the Forward Look is published (6). The precise timing and length of the debate would be determined through the usual Parliamentary channels.

THE FORM OF THE DOCUMENT

The main body of the Forward Look should be as similar as possible for year to year; this will be made easier if a strategic framework is developed. The Essays provide an adequate opportunity for the OST to address a variety of topical issues or to give each issue a common theme. (Para 18)

2. The Government agrees with the Committee (18) that the tripartite arrangement of a strategic overview accompanied by forward looking statements from individual Departments and Research Councils and a statistical account of public expenditure on science and technology provides a framework for the Forward Look which meets present needs. It enables, for example Departmental programmes to be more readily related to the Government's overall strategy for science, engineering and technology (SET) as the White Paper "Realising our potential" envisaged.

3. Not all topics will necessarily need to be dealt with in the same depth each year, however, and the Government agrees with the Committee that the selection of highlights is one means of permitting topical issues or common themes to be explored in detail.

We recommend that the OST consider increasing the level of detail on industrial and university research in next year's Forward Look, to help it become a comprehensive review of all UK science, engineering and technology, however funded. (Para 22)

4. The Government notes the view of the Committee (22) that the Forward Look should become a comprehensive review of all UK SET, however funded. The Forward Look is primarily intended to report publicly-funded expenditure on SET. The Statistical Supplement to the Forward Look does include, as did its predecessor the Annual Review of Government-funded Research and Development (R&D), a report on Business Enterprise R&D (BERD) and reference to private non-profit and overseas funding for R&D, performed in the UK, within the total Gross Domestic Expenditure on R&D (GERD).

5. There are no plans to extend the coverage of business sector R&D. A number of other published sources already well document expenditure on R&D by industry including the Central Statistical Office (CSO) "First Release" and "Economic Trends" articles on R&D expenditure and the annual UK R&D Scoreboard produced by Company Reporting Limited and the Department of Trade and Industry (DTI).

6. Comprehensive statistics on university research will be published by the Higher Education Statistical Agency (HESA) and were previously published by the Universities' Statistical Record. The Government does not see the need to duplicate these data in the Forward Look, but will certainly draw on such data in the strategic overview, as appropriate.

7. The Government will keep under consideration the extent to which additional information on university research should be included in each Forward Look. One example which might be anticipated is that the Forward Look would include reference to the strategy and outcomes for the periodic Research Assessment Exercises which are conducted by the Higher Education Funding Councils.

8. The Government inclines to the view that the Forward Look should be as concise as possible. Excessive detail may reduce its impact and there is little to be gained from reproducing data already published in other sources (often at different times to that for publication for the Forward Look).

THE CONTENTS OF THE FORWARD LOOK

Gross Domestic Expenditure on R&D

The OST should examine the consequences of the low level of civil research and development in the UK. (Para 23)

9. The Government notes the international comparisons made by the Committee of total investment in civil R&D in the UK (23).

10. One of the main messages contained in the 1994 Forward Look was that while some companies and sectors are world class the evidence shows that for others their investment in R&D lags behind that of overseas competitors. It is ultimately for companies to take responsibility for the contribution which investment in R&D can make to their overall innovative capacity and competitiveness. The 1994 R&D Scoreboard showed a 9 per cent increase in reported R&D investment by UK companies over the previous year.

11. The level of investment in R&D as a fraction of Gross Domestic Product (GDP) is an important measure but by no means the only factor to impact on the longer-term competitiveness and innovative capacity of UK industry. As important are the outputs of R&D and the climate for business in the UK.

12. The White Paper "Realising our potential" set out the Government's continuing commitment to harnessing publicly-funded SET more effectively to support wealth creation and improve the quality of life. The White Paper "Competitiveness: Helping business to win" emphasised the importance of innovation for sustained competitiveness and wealth creation.

13. Both White Papers addressed the ways in which Government is working to create the right climate and conditions so as to assist companies to improve their innovative performance and competitiveness. The contribution made by Government comes, for example, from:

- providing the stable macroeconomic environment which enables business to plan ahead with confidence;
- improving value for money in public sector services and pursuing tax policies which encourage enterprise and do not hinder economic efficiency;
- making markets work more efficiently, and broadening the influence of market disciplines on resource allocation;
- funding for R&D undertaken by the science and engineering base; for R&D commissioned by Government Departments, and for R&D undertaken by European programmes;
- a longer term assessment of the portfolio of publicly-funded SET best suited to the needs of the country;
- support for a range of activities promoting access to and exploitation of existing technology;
- access to advice and services in support of innovation, involving all aspects of business;
- improved access to EC R&D programmes, especially for smaller firms; and

— support for industry and university partnerships.

14. The Government is also working to ensure that the maximum commercial spin-off and dual use by industry of SET undertaken or supported by Departments in pursuit of their policy objectives is realised. The 1994 Forward Look referred to a number of ways in which this is currently being achieved, including links between the Department of the Environment and the construction industry and between the Departments of Health and the medical technology industries. Subsequent Forward Looks will report the further progress achieved.

15. The Technology Foresight Programme—a key initiative in the SET White Paper—is intended to provide a systematic assessment of opportunities by examining both market developments and technological capabilities within the UK over the next 20 years. The outcomes of the Technology Foresight programme—which is being undertaken jointly between Government, industry and the science and engineering base—will help to inform future decisions on priorities for publicly-funded SET, wich will be reflected in future Forward Looks.

We recommended that the historic figures for BERD by industrial sector also be expressed in real terms in next year's issue of the Forward Look. (Para 27)

16. Table 1.4.1 of the Statistical Supplement to the Forward Look provides both cash and real terms figures for *total* BERD over the period 1981–92. The CSO "First Release" (CSO(93)188) of the 1992 BERD data provides, in Table 7, real terms expenditure data by industrial sector (both civil and defence) for the three years 1990–92. The Government accepts the view of the Committee that it would be of value to reproduce this data in the 1995 Forward Look to provide a more complete picture of the trends in UK business enterprise R&D activity (27).

17. In the past, information on BERD has been disaggregated into about 50 product groups: the survey data (published on 17 December 1994) were broken down into 33 product groups and also into the standard industrial classifications of the R&D performing companies. However, the CSO cannot disaggregate its published statistics to the company, or public corporation, level as this would breach the confidentiality of this statutory survey.

18. In considering how to assess the UK private sector performance on the international stage, the Committee's attention is directed toward other information that is gathered and published by the OECD. In addition to the Main Science and Technology Indicators database, the OECD also produce an Analytical Business Enterprise R&D database (ANBERD) which makes international comparisons of business enterprise R&D by detailed industrial sectors.

19. The ANBERD database also contains other consistent industrial data which can be used as denominators in ratios with R&D activity to develop other comparisons than those based on company dividend payments.

20. The OECD also compiles the STIBERD database which provides limited international comparisons of BERD adjusted to take into account the differing industrial structures of each country.

We consider that the level of foreign R&D investment in the UK would be an important indicator of the strength of the science base. The OST and the Central Statistical Office (CSO) should address this matter so that, in addition to BERD, a measure of industrial R&D exists which accurately reflects all industrial R&D performed in the UK irrespective of the ownership of the firms involved. (Para 29)

21. The Committee's recommendation that a measure of foreign R&D investment be provided (29) is fully met by the CSO statutory survey of BERD. This includes *all* industrial R&D funded by business enterprise from *all* sources (both from within the UK and from overseas) by *all* businesses performing R&D and operating in the UK regardless of the contry of ownership.

22. The Government recognises the importance attached to information about the extent of overseas investment in UK SET and will separately identify this in the 1995 Forward Look within the presentation of BERD.

23. The R&D Scoreboard is based on published company annual accounts of R&D expenditure, both intramural and extramural (in UK and overseas) funded by own resources by UK companies listed on the London Stock Exchange. It does not include foreign owned companies or public corporations. Take-overs by UK listed companies of overseas R&D performing companies would affect the R&D Scoreboard but not the BERD figures.

24. The Office of Science and Technology (OST), the CSO and the DTI continually strive to improve the quality of the information available on the business sector funding of R&D.

We trust that the OST and DTI will pay close heed to representations on improving the usefulness of the statistics in the R&D Scoreboard. (Para 31)

25. As part of the remit of DTI's Innovation Unit to help foster the climate for innovation, the UK R&D Scoreboard, produced by Company Reporting Limited (on behalf of the DTI Innovation Unit), is a useful tool in raising awareness and stimulating greater dialogue between industry and investors.

26. However, DTI is continuously seeking to improve the quality and usefulness of the Scoreboard's data. For example, DTI's Innovation Unit is considering how best to reflect the financing costs incurred by companies. A wide variety of financial structures exists world-wide. The DTI recognises that simple cross-country comparisons cannot be made using dividend payments alone.

27. One of the objectives for the R&D Scoreboard is to encourage companies to report their R&D spending more fully. Given the gradual rise in the number of companies reporting R&D spending, the Scoreboard would appear to be fulfilling this objective.

28. The 9 per cent increase in UK R&D reported in 1994 represented a real increase, on a like-for-like basis, over spending in 1993. It is not an artifice of the increased number of companies reporting R&D spending in 1994. The totals for 1993, 1992, and 1991 were recalculated to include reported R&D spending in those years by companies joining the UK R&D Scoreboard for the first time in 1994 (for example, the 1993 total rose from £6,475,164,000 to £6,521,107,000 when companies joining the R&D Scoreboard for the first time in 1994 were included).

29. The DTI shares concern about a large amount of R&D expenditure that is not captured by the R&D Scoreboard's unlisted company section. The main part of the Scoreboard uses R&D data that is declared in UK listed companies' Reports, under the provision of Statement of Standard Accounting Practice (SSAP 13). The UK unlisted companies are those identified by Company Reporting as having R&D activity and which responded positively to a request for their annual report and accounts.

30. DTI also agrees that there is often serious under-reporting of R&D spending in the UK by foreign owned multi-nationals. Frequently these companies do not report R&D spending in the host country; this is considered a central corporate overhead and subsumed into a global R&D budget. Thus R&D is reported in the parent company's country only, and/or significantly under-reported in the host country. Examples of this include: IBM who spend about £145 million annually on R&D in the UK, but report none here and Siemens, who reported the £1 million spent by Siemens plc in 1993–94, but not the £172 million (1992–93) invested in R&D by the UK divisions of the German multi-national parent.

31. The presence of the R&D Scoreboard has led some of the UK subsidiaries of foreign owned multi-nationals to seek agreement from their parent companies to report R&D spend in the UK. The DTI welcomes this.

32. DTI will be considering how best to make coverage of unlisted UK and foreign owned companies more complete in the 1995 R&D Scoreboard. The task is not trivial. The ultimate responsibility for reporting R&D spending lies with the companies themselves.

The OST should reflect on whether the indicators in this year's Forward Look adequately reflect science, engineering and technology activity in the UK, and whether a standardised measure could be used in next year's issue. (Para 34)

33. The Government recognises the, now, widely held view put to the Committee that research and development are only a part of the overall process of innovation (34).

34. The Government is aware that the recording of R&D activity in small businesses may be incomplete due to the problem of separating R&D from other activities carried out by a small number of multi-functional personnel, such as product development, technical support, marketing and finance. This year's BERD survey, which will include some 5,000 enterprises in the UK, will include many smaller companies. The results of the survey will be disaggregated by company size enabling the performance of small companies to be compared with larger companies in the same industrial sector.

The fall in government spending in real terms on civil research and development by £577 million and on defence research and development by £1,100 million in the 12 years from 1984–85 to 1996–97 is a major strategic shift which is likely to have an impact on the development of advanced technology in the UK. The OST should examine its implications for competitiveness. (Para 43)

35. The Committee drew attention in its report to the fall in Government spending on R&D during the period 1984–85 to 1996–97 which it felt would have an impact on the development of advanced technology. The Committee recommended that the OST should examine its implications for competitiveness (43).

36. The Government has already addressed, in paragraph 13 of this response to the Committee's recommendations, the ways in which Government is contributing to creating the right climate and conditions to enable all companies to meet the challenge of innovation.

37. In addition, the Government's continuing commitment to funding basic and strategic research is shown by the fact that the planned Science Budget allocation to the Research Councils will be some 30 per cent higher in real terms in 1995–96 compared with 1979–80.

38. The fall in expenditure on civil R&D is largely the result of reductions in Fast Breeder research, and an increase in receipts from DTI's Launch Aid initiative. Some Departments, such as the Department of Health and the Department of Environment, have increased expenditure in recent years and others, such as the Home Office, have maintained expenditure in real terms.

39. Changing Defence needs are leading to changes in the balance and direction of the Defence R&D programmes. Planned reductions in defence R&D already announced by the Government will be proportionately greater in defence development than in research. These reductions are being accompanied by increased efforts to secure more returns to the civil sector from defence R&D and a continuing drive for greater cost-efficiency.

40. Measures announced in the SET White Paper "Realising our potential" and DTI's refocussed science and technology policy are geared towards improving UK competitiveness. For example, the Technology Foresight programme and the commitment to support wealth creation included within the new missions for the Research Councils and the science and technology mission statements for Government Departments will ensure that future Government measures are relevant to the needs of industry and will contribute to improving the competitiveness of the UK.

41. These measures were built on by activities announced in the White Paper on Competitiveness. For example, the funding of Innovation and Technology Counsellors in Business Links; the introduction of Innovation Credits; and the establishment of better local and national networks. Small firms continue to receive support through the SMART and SPUR schemes and there is support for industry/academic collaboration through LINK and European collaboration through the Eureka programme.

42. It is important also to take into account the growing impact of the enlarged EC Framework Programme—to which the UK science, engineering and technology community has access. The latest statistics from the European Commission indicate that UK researchers have been extremely successful in winning contracts under the Third Framework Programme, with 2,300 contracts awarded to UK teams compared with 2,200 awarded to organisations from France and Germany.

43. The UK has also played a significant part in shaping the structure and priorities of the Fourth Framework Programme, where the key objective is "strengthening the scientific and technological bases of European Community industry and encouraging it to become more competitive at international level". (Article 130F of the Treaty on European Union refers). This is reflected in the industrial orientation of many of the programmes. The UK was successful, in the negotiation of the Fourth Framework Programme, in shifting the balance of activities in favour of sectors such as biotechnology and biomedicine where there is not only a high growth potential but also where Europe and, in particular the UK, are competitive in global terms. The Government's strategy is to ensure maximum complementarity between EC programmes and UK domestic S&T programmes and priorities and to ensure maximum take up by the UK S&T community of opportunities presented by the Framework Programmes, including increased participation by Small and Medium Enterprises (SMEs).

Measuring the outputs from R&D

We strongly support the development of output measures of the effectiveness of R&D. We intend to review next year the progress the OST has made in devising such measures. The evidence given in our First Report on the effect of business research and development on total factor productivity is an example of output measurement of the kind that the OST should pursue. (Para 48)

44. The Government takes the view that it is important also to look at outputs of SET rather than concentrate only on inputs.

45. The Government agrees with the Committee about the importance of developing output measures of the effectiveness of R&D in wealth creation, improving the quality of life and in underpinning Departmental objectives (48).

46. The Government welcomes the recognition by the Committee that this may be particularly difficult for Departmental programmes.

47. The OST is currently working with other Government Departments to develop performance measures. These are intended to demonstrate adequate systems for consulting those with an interest in Departmental R&D programmes, success in collaboration with industry, the promotion of commercial exploitation of research and improvements in the quality of life. Developing meaningful measures will take time and progress will be reported in the 1995 Forward Look.

The coordinating role of the OST

We hope in future to see evidence that the OST is using its powers to act as an effective guardian of the government's science policy. (Para 51)

48. The Government welcomes the Committee's acknowledgement of the importance of the coordinating role for the Office of Science and Technlogy (51). The White Paper "Realising our potential" set out clearly the mission for the Office of Science and Technology as it did also for other Government Departments and

for the Research Councils. Success in implementing these missions will be reported on through the Forward Look.

The role of the Science and Engineering Base

We endorse the approach of the OST in encouraging research into what is relevant to wealth creation and the quality of life while ensuring that this does not impede the principal role of the science base, which is to train scientists and conduct basic research. We would like to see some indication in the next issue of the Forward Look that these objectives are being achieved. (Para 60)

49. We welcome the Committee's endorsement of the reorientation of the UK's research effort (60). Like the Select Committee, the Government sees no conflict between sustaining the excellence of the science and engineering base and reorienting basic and strategic research towards areas which have wealth creation and quality of life potential. The Research Councils have a remit to support high-quality basic, strategic and applied research in order to fulfil their missions. The DGRC, together with the Research Councils, will be keeping this balance of support under review; reports on progress will be made in future Forward Looks.

50. The Higher Education Funding Councils (HEFCs) support research and teaching in science, engineering and technology in higher education institutions (HEIs). The HEFCs are giving further encouragement for HEIs to develop links with industry and other user communities and to increase the contribution of their research to wealth creation and the quality of life.

The Research Councils

There may be scope within the administration of the Research Councils for economies which would allow more money to be spent on science and technology. We look forward to receiving the results of the DGRC's zero-based review of the Research Councils' activities in time for the results to be contained in the 1995 Forward Look. (Para 62)

51. The Government endorses the view of the Committee (62) that, within the requirements of efficiency and effectiveness, as much as possible of the funds made available for R&D should be directed to research rather than administration. The outcome of the review of the Research Councils' programmes by the Director General for the Research Councils will be reported in the 1995 Forward Look.

International collaboration

The Government should continue to press for good housekeeping in Brussels, ensure that the Fourth Framework Programme is as relevant as possible to the UK, and encourage the maximum participation in the Programme by UK industry. (Para 67)

52. The Government shares the Committee's recognition of the importance of effective management and sound cost control in activities conducted under the EC Fourth Framework Programme (67). Considerable efforts were made to consult widely within the UK SET community in preparing for the negotiation of this new Framework Programme, and the Government regards the overall breakdown of the Programme (finalised in April 1994) to have been highly satisfactory, closely reflecting UK priorities.

53. The UK has been, and continues to be, in the forefront of Member States encouraging the process of continuing improvement in managerial effectiveness over individual programmes. The aim is to achieve both maximum value for money and increased "user-friendliness" for researchers bidding for resources. In this context, the UK has particularly encouraged the wide-scale adoption of peer review as a basis for project appraisal, and greater transparency of administrative procedures. Both are designed to increase external confidence in the independence and quality of EU Framework Programme research and development.

54. A key target within the UK has been to maximise the take-up of the opportunities provided by the Framework Programme by UK researchers in both the public and private sectors. Evidence available from the Third Framework Programme shows very satisfactory results. In areas where severe over-subscription for available funds occurred, the UK worked strenuously in management committees and elsewhere to emphasise the importance of more focused objectives designed to avoid over-subscription and the wasted time this can imply for European researchers.

55. The 1995 Forward Look will contain information on the total Framework Programme R&D funding received by UK institutions in the public and private sectors.

56. The Government shares the view of the Committee that it is important to encourage the maximum participation by industry in the Framework Programmes (67). During consultations with the European Commission over the Fourth Framework Programme, not only did the Government influence how the programme would be managed, it also ensured that industry's needs were kept to the fore. The Government is to run a major publicity initiative to stimulate industrial participation.

The expenditure of such a large amount of money [£700m over 10 years] on a single project [the Large Hadron Collider] must be very carefully, and publicly, justified by the OST. (Para 70)

57. The Government agrees with the Committee that it is essential that a project on the scale of the Large Hadron Collider (LHC) is rigorously assessed (70). Scientific excellence, technical feasibility and tight cost control must all be assured before such projects are allowed to go ahead. Furthermore, opportunities to broaden participation internationally should be actively explored.

58. Before starting discussions on the LHC, which will cost around £1.5bn (including staff costs), a comprehensive scientific and technological assessment was completed. This concluded that the project was of the highest quality and the right step for high energy physics research. The Particle Physics and Astronomy Research Council, which pays the UK subscription to CERN, has made the LHC its top priority. Over the course of 1994, a fair, sustainable and realistic planning and financial framework was developed which ensured that costs would be kept to a minimum and firmly controlled. As a result, CERN's budget (to which the UK currently contributes around £65m each year for all of CERN's research programmes) will not increase in cash terms before 1998, and any increases thereafter will be below the rate of inflation. Furthermore, the LHC project can be completed within known resources, which is fundamental to securing the involvement of countries which do not yet contribute to CERN.

59. On this basis, the UK, along with other CERN member states, was able to give formal approval for the LHC project at the CERN Council meeting in December 1994. Prospects for the LHC becoming the first truly global project of its kind are promising. The Government will actively encourage and assist CERN in making this a reality.

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